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## REMARKS

Reconsideration of the application is requested in view of the modifications above and the remarks below. Claims 1, 6, 7, and 9 were amended to address wording issues raised by the Office Action. The Office Action indicated that Claim 3 would be allowable if placed in independent form. Claim 3 was cancelled and placed in independent form as Claim 11.

A. Rejection Under 35 USC 112, second paragraph

The Office Action rejected Claims 6-7 and 9 under 35 USC 112, second paragraph, for various informalities. In view of the modifications above, the rejections are believed overcome. Reconsideration is requested.

B. Rejection Under 35 USC 102

1. The Office Action rejected Claims 1 and 7-10 under 35 USC 102 over U.S. Pat. No. 6,264,818 (Heider). The rejection should be withdrawn in view of the modifications above and the remarks below.

It is well settled that in order for a prior art reference to anticipate claim, the reference must disclose each and every element of claim with sufficient clarity to prove its existence in prior art. The disclosure requirement under 35 USC 102 presupposes knowledge of one skilled in the art of a claimed invention, but such presumed knowledge does not grant license to read into prior art reference teachings that are not there. See Motorola Inc. v. Interdigital Technology Corp. 43 USPQ2d 1481 (1997 CAFC).

Applicants' invention as encompassed by Claims 1 and 7-10 relates to a process for the continuous preparation of perfluorinated organic compounds by electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride that has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte. In one embodiment, the addition of the non-fluorinated or the partially fluorinated compound is carried out continuously or discontinuously. In another embodiment, the current density at which the electrolysis is carried out from about 5 to about 40 mA/cm<sup>2</sup> and the voltage is from about 5 to about 10 volts. In another embodiment, the process is carried out at a temperature of from 0 to about 20°C

and a pressure of from about 0.8 to about 2 bar. And in another embodiment, the hydrogen fluoride used has an arsenic content of less than about 10 ppm.

Heider discloses a process for preparing perfluoroalkylfluorophosphoranes of the general formula  $(C_n F_{2n+m})_y PF_{5-y}$  (I), in which  $n$  is 1, 2, 3, 4, 5, 6, 7 or 8,  $m$  is +1 or -1, and  $y$  is 1, 2 or 3, in which the ligands  $(C_n F_{2n+m})$  may be identical or different, and also to their use as electrolytes and as precursors for conducting salts, and to their use in lithium batteries (See Column 1).

Heider's process for preparing perfluoroalkylfluorophosphoranes does not anticipate a process that continuously prepares perfluorinated organic compounds by electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride at a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte. Heider does not anticipate the other embodiments of Applicants' invention. Importantly, Heider discloses at Column 3, lines 42-44 that the „liquid reaction product is periodically withdrawn and the volume withdrawn is replaced by adding hydrogen fluoride with a new starting material.“ In other words, Heider does not place Applicants' process in the possession of the public. Reconsideration is requested.

2. The Office Action rejected Claims 1, 7 and 10 under 35 USC 102 over DE 2,725,211 (DE '211). The rejection should be withdrawn in view of the modifications above and the remarks below.

Applicants' invention as encompassed by Claims 1, 7 and 10 relates to a process for the continuous preparation of perfluorinated organic compounds by electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride that has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte. In one embodiment, the addition of the non-fluorinated or the partially fluorinated compound is carried out continuously or discontinuously. In another embodiment, the hydrogen fluoride used has an arsenic content of less than about 10 ppm.

DE '211 discloses the preparation of perfluoroalkanesulphonyl fluorides by electrolysis of a solution of an alkanesulphonyl halide and/or a cyclic unsaturated

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sulphone in practically anhydrous HF. The process involves (a) using anodes having surfaces that have been mechanically roughened and (b) using an electrode that has already been electrolysed with a quantity of electricity of more than or equal to 1 Ah per cc of electrolyte and/or which has already produced 0.05 g of (I) per cc of electrolyte. The compounds made are useful as intermediates for preparing repellants and surfactants.

DE '211's preparation of perfluoroalkanesulphonyl fluorides by electrolysis of a solution of an alkanesulphonyl halide and/or a cyclic unsaturated sulphone in practically anhydrous HF does not anticipate Applicants' process. DE 211's disclosure that its process uses (i) anodes having surfaces that have been mechanically roughened and (ii) an electrode that has already been electrolysed with a quantity of electricity of more than or equal to 1 Ah per cc of electrolyte and/or which has already produced 0.05 g of (I) per cc of electrolyte does not disclose a process that continuously prepares perfluorinated organic compounds by electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride having a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte (or the other embodiments encompassed by Applicants' invention). In other words, DE '211 anodes are conditioned for the electrochemical fluorination process and relate to an application that is fundamentally different from Applicants' invention. Reconsideration is requested.

3. The Office Action rejected Claims 1, 4, 6-8, and 10 under 35 USC 102 over U.S. Pat. No. 5,366,597 (Bulan '597). The rejection should be withdrawn in view of the modifications above and the remarks below.

Applicants' invention encompassed by Claims 1, 4, 6-8, and 10, relates to a process for the continuous preparation of perfluorinated organic compounds comprising electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride having a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte. In one embodiment, the non-fluorinated or partially fluorinated organic compounds are sulfolane, sulfolene, butylsulfonyl fluoride, butylsulfonyl chloride or mixtures thereof. In another embodiment, the electrolyte at the commencement of

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the fluorination comprises from about 98% by weight of hydrogen fluoride and 2% by weight of the non-fluorinated or partially fluorinated organic compound. In another embodiment, the addition of the non-fluorinated or the partially fluorinated compound is carried out continuously or discontinuously. In another embodiment, the current density at which the electrolysis is carried out is from about 5 to about 40 mA/cm<sup>2</sup> and the voltage is from about 5 to about 10 volts. And in another embodiment, the hydrogen fluoride used has an arsenic content of less than about 10 ppm.

Bulan '597 discloses a process for the preparation of perfluorobutylsulphonyl fluoride by electrochemical fluorination of butylsulphonyl fluoride, tetrahydrothiophene-1,1-dioxide (sulpholane), 2,5-dihydrothiophene-1,1-dioxide (sulpholene) or mixtures of these in hydrogen fluoride.

Bulan's '597 process for making perfluorobutylsulphonyl fluoride by electrochemical fluorination of butylsulphonyl fluoride, tetrahydrothiophene-1,1-dioxide, 2,5-dihydrothiophene-1,1-dioxide or mixtures of these in hydrogen fluoride does not place Applicants' invention in the possession of the public. In the Bulan '597 process, the material to be fluorinated is added according to the reaction equation (cf. col. 2, lines 18-41). At the beginning of the electrochemical fluorination about 2% by weight of the material to be fluorinated is initially introduced into the hydrogen fluoride in order to prevent the formation of detonating fluorine gas at the beginning of the electrochemical fluorination process. This procedure is only carried out in the initiation step. According to the reaction equation of Bulan '597, as soon as the electrochemical fluorination has been initiated, the material to be fluorinated is metered into the electrolyte. Since, in electrochemical fluorination processes operated over longer periods of time, the products formed cannot be precisely determined, the quantity of material to be fluorinated in the electrolyte either decreases or increases. Bulan '597 simply lacks the details to disclose a process for the continuous preparation of perfluorinated organic compounds comprising electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride having a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte. Reconsideration is requested.

C. Rejections Under 35 USC 103

1. The Office Action rejected Claims 2, 5, and 6 under 35 USC 103 over Heider. The rejection should be withdrawn in view of the modifications above and the remarks below.

It is well-established that in a sense, virtually all inventions are combinations of old elements (*In re Rouffet*, 47 USPQ2d 1453, 1457), and that the USPTO may often find every element of a claimed invention in the prior art. *In re Rouffet*, 47 USPQ2d 1457. If identification of each claimed element in the prior art were sufficient to negate patentability, very few patents would ever issue. *In re Rouffet* at 1457. It is also well established that to establish a *prima facie* case of obviousness, the USPTO must satisfy all of the following requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify a reference or to combine references. *In re Fine*, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Second, the proposed modification must have had a reasonable expectation of success, as determined from the vantage point of one of ordinary skill in the art at the time the invention was made. *Amgen v. Chugai Pharmaceutical Co.* 18 USPQ 2d 1016, 1023 (Fed Cir, 1991), *cert. denied* 502 U.S. 856 (1991). Third, the prior art reference or combination of references must teach or suggest all of the limitations of the claims. *In re Wilson*, 165 USPQ 494, 496, (CCPA 1970). The Office Action did not establish a *prima facie* case of obviousness.

Applicants' invention, as encompassed by Claims 2, 5, and 6, relates to a process for the continuous preparation of perfluorinated organic compounds comprising electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride having a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte. In one embodiment, the quantity of charge is kept in the range from about 50 to about 200 Ah per kg of electrolyte. In another embodiment, the electrolyte salts are added to the hydrogen fluoride. In another embodiment, the electrolyte at the commencement of the fluorination comprises from about 98% by weight of hydrogen fluoride and 2% by weight of the non-fluorinated or partially

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fluorinated organic compound.

Heider teaches a process for preparing perfluoroalkylfluorophosphoranes of the general formula  $(C_n F_{2n+m})_y PF_{5-y}$  (I), in which  $n$  is 1, 2, 3, 4, 5, 6, 7 or 8,  $m$  is +1 or -1, and  $y$  is 1, 2 or 3, in which the ligands  $(C_n F_{2n+m})$  may be identical or different, and also to their use as electrolytes and as precursors for conducting salts, and to their use in lithium batteries.

One of ordinary skill in the art following Heider would not have been motivated to modify Heider and practice Applicants' invention. Heider's process for preparing perfluoroalkylfluorophosphoranes of the general formula  $(C_n F_{2n+m})_y PF_{5-y}$  (I), simply does not have meaningful details that would have motivated the artisan to modify Heider and practice a process for the continuous preparation of perfluorinated organic compounds comprising electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride having a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte. As discussed above, Heider teaches a non-continuous process. Heider teaches that the "liquid reaction product is periodically withdrawn and the volume withdrawn is replaced by adding hydrogen fluoride with new starting material." Indeed, Heider teaches a mixture of hydrogen fluoride and the material to be fluorinated (the "starting material") is added batchwise to the electrolyte. This is different from the continuous procedure used in Applicants' invention.

As such, Applicants' process, electrolysis is carried out continuously. In industrial electrolysis processes, batch procedures corresponding to that of Heider are not possible for safety reasons since the quantity of charge required for the complete conversion of the material to be fluorinated cannot be precisely calculated. As such, Heider's teachings would not have led one of ordinary skill in the art to Applicants' invention. Reconsideration is requested.

2. The Office Action rejected Claims 2, 5-6 and 8-9 under 35 USC 103 over DE '211. The rejection should be withdrawn in view of the remarks below. DE '211 teaches the preparation of perfluoroalkanesulphonyl fluorides by electrolysis of a solution of an alkanesulphonyl halide and/or a cyclic unsaturated sulphone in practically anhydrous HF. The process involves (a) using anodes

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having surfaces that have been mechanically roughened and (b) using an electrode that has already been electrolyzed with a quantity of electricity of more than or equal to 1 Ah per cc of electrolyte and/or which has already produced 0.05 g of (I) per cc of electrolyte. The compounds made are useful as intermediates for preparing repellants and surfactants.

One of ordinary skill following the teachings of DE '211 would not have been motivated to modify DE '211 and practice Applicants' invention. DE 211's teachings to a) use anodes having surfaces that have been mechanically roughened and (b) use an electrode simply does not meaningful details that would have led one of ordinary skill in the art to Applicants' invention. Reconsideration is requested.

3. The Office Action rejected Claims 2, 5-6 and 8-9 under 35 USC 103 over Bulan.

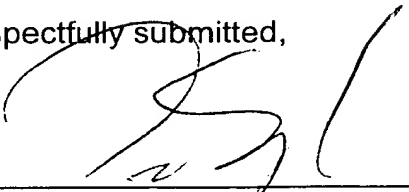
Bulan teaches a process for the preparation of perfluorobutylsulphonyl fluoride by electrochemical fluorination of butylsulphonyl fluoride, tetrahydrothiophene-1,1-dioxide (sulpholane), 2,5-dihydrothiophene-1,1-dioxide (sulpholene) or mixtures of these in hydrogen fluoride. Bulan's process for preparing perfluorobutylsulphonyl fluoride by electrochemical fluorination of butylsulphonyl fluoride, tetrahydrothiophene-1,1-dioxide (sulpholane), 2,5-dihydrothiophene-1,1-dioxide (sulpholene) or mixtures of these in hydrogen fluoride would not have motivated one of ordinary skill in the art to modify Bulan and practice Applicants' invention.

Bulan's process for making perfluorobutylsulphonyl fluoride by electrochemical fluorination of butylsulphonyl fluoride, tetrahydrothiophene-1,1-dioxide), 2,5-dihydrothiophene-1,1-dioxide or mixtures of these in hydrogen fluoride would not have motivated one of ordinary skill in the art to modify Bulan, practice Applicants' invention and expect its results. Bulan simply lacks the details to disclose a process for the continuous preparation of perfluorinated organic compounds comprising electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride having a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte. Reconsideration is requested.

In view of the foregoing modifications and remarks, the allowance of the pending claims is earnestly requested.

Respectfully submitted,

By



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Claims 1, 6, 7, and 9 were amended as follows:

1. (Amended) A process for the continuous preparation of perfluorinated organic compounds comprising electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compounds with an electrolyte comprising hydrogen fluoride that has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte.

6. (Amended) The process according to Claim 1, wherein the electrolyte at the commencement of the fluorination comprises from about 98% by weight of hydrogen fluoride and 2% by weight of the non-fluorinated or partially fluorinated organic compound.

7. (Amended) The process according to Claim 1, wherein the addition of the non-fluorinated or the partially fluorinated compounds is carried out continuously or discontinuously.

9. (Amended) The process according to Claim 1, wherein the ~~reaction~~ process is carried out at a temperature of from 0 to about 20°C and a pressure of from about 0.8 to about 2 bar.

Please add new Claim 11:

-- 11. A process for the continuous preparation of perfluorinated organic compounds comprising electrochemically fluorinating a non-fluorinated or a partially fluorinated organic compound with an electrolyte comprising hydrogen fluoride that has a quantity of charge that ranges from about 5 Ah per kg of electrolyte to about 600 Ah per kg of electrolyte, wherein the hydrogen fluoride has a water content of less than about 300 ppm, a sulfuric acid content of less than about 300 ppm, a sulfur dioxide content of less than about 30 ppm and an arsenic content of less than about 30 ppm. --